PC-489

(524) M.Sc. PHYSICS (FOURTH SEMESTER)

Examination JUNE 2020

Compulsory/Optional

Group -

Paper - II

NUCLEAR-PHYSICS

Time:- Three Hours] Maximum Marks : 80

Minimum Passing Marks: 29

नोट : दोनों खण्डों से निर्देशानुसार उत्तर दीजिए। प्रश्नों के अंक उनके दाहिनी ओर अंकित है।

Note: Answer from Both the Section as Directed. The Figures in the right-hand margin indicate marks.

Section -A

1. Answer the following very short type questions: - **1X10 = 10**

   (a) How does the range (R) of α - particles depend on their velocity (v)?

   (b) In 1932, how Chadwick discovered neutrons?

   (c) What neutrino hypothesis indicates?

   (d) Why Q value is same in laboratory and centre of mass reference system.

   (e) In nuclear reactor how nuclear chain reaction is controlled?

   (f) For thermonuclear reaction on earth, how high temperature can be achieved?

   (g) Why it is impossible to obtain electrons of very high energy from a cyclotron?

   (h) What is scintillation?

   (i) Define elementary particles.

   (j) What is charge conjugate operator?

2. Answer the following short type questions:- **2x5 = 10**

   (a) Explain origin and discreteness of gamma - variation associated with α - decay.

   (b) Explain β ray spectra.

   (c) Write down the classification of neutrons released in fission process.

   (d) Describe some linear accelerators.

   (e) What are mesons? Discuss the decay modes of different mesons.

Section -B

Answer the following long answer type questions. 15x4 = 60

3. Describe the theory of α - decay and hence obtain an expression for theoretical form of Geiger - Nuttal law.

   Or

   Discuss about three forms of β decay and neutrino hypothesis.

4. Describe resonance scattering and reactions and show that resonance reaction is always associated with resonance scattering.

   Or

   Describe nuclear reactor and its parts.

5. Describe scintillation process in scintillation counter and obtain an expression for pulse height.

   Or

   Describe construction, principle of working and energy limit of electron synchrotron.

6. Discuss about conservation laws of elementary particles.

   Or

   Discuss about invariance principle and symmetry of elementary particles.